

Database and Alignment Plans

02-12-2020

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Online Database

STAR ONLINE STATUS viewer RUN 21

STAR ONLINE STATUS

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 Conditions_bbc

+

 Conditions_daq

+

 Conditions_epd

+

 Conditions_etof

+

 Conditions_fcs

+

 Conditions_fps

+

 Conditions_gmt

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 Conditions_mtd

+

 Conditions_rhic

+

 Conditions_rich

+

 Conditions_sc

+

 Conditions_stgc

+

 Conditions_tof

+

 Conditions_tpc

+

 Conditions_vpd

+

 Conditions_zdc

+

 TPC Drift Velocity

+

 SC Archive

+

 Environment

Introduction

Fast Overview *

DAQ Room *

Description

STAR ONLINE Status Viewer allows one to view actual (past 48 hours, past 7 days, selectable range) online db statistics for STAR subsystems, collected by online daemons. Please select required subsystem or channel using left panel (tree). Note that in most cases you'll get an overview plot first, followed by individual channels plots (submenu option). All plots will open in a separate tab inside this page, for convenience. Tabs could be closed by clicking at [x] sign.

For a quick overview of most critical plots, you can try Fast Overview (see tabs above).

SC Archive category is populated using static images, updated every 5 minutes on server side. This is done so because to our security restrictions - one cannot set time range for those plots.

Acknowledgments:

- Jamie Dunlop - complex functions, derived plots suggestions;
- Howard Wieman and William Llope - interface improvements suggestions;

Settings

PREFERRED TIME RANGE: 24 hrs , PREFERRED IMAGE SIZE: 100% 

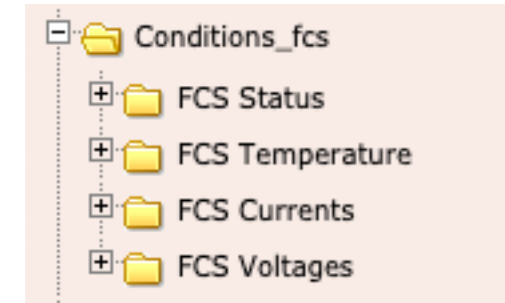
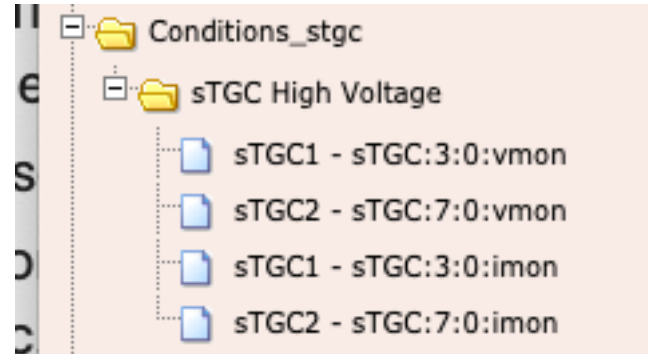
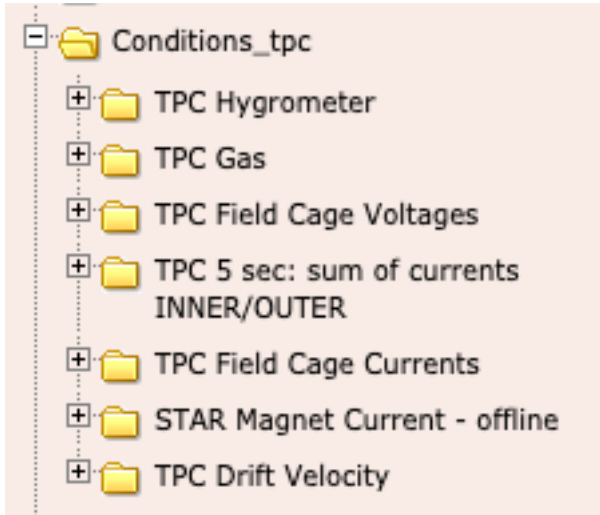
Security

[Privacy and security notice](#)

Contact Information

Please send your comments and suggestions to : [Dmitry Arkhipkin](#)

TPC example & Existing sTGC + FCS



Electronics:

- TPC currents
- Voltages

Gas:

- TPC Gas (many flow meters and gas pressures)
- Hygrometer (Temp, dew point, humidity)

Electronics:

- Voltage
- Current

Gas:

- None yet

Electronics:

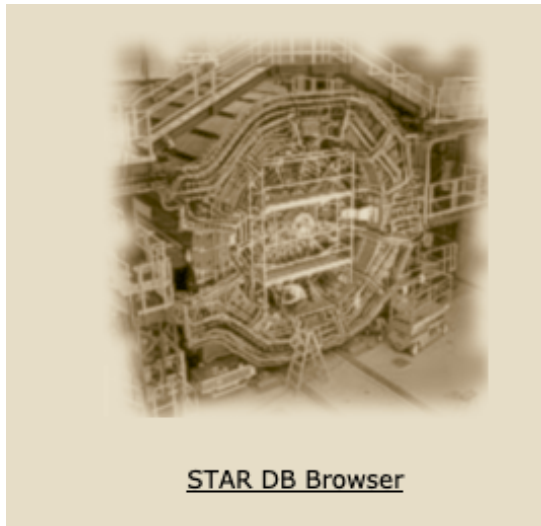
- Voltage
- Current
- Temperature
- LV status

What is needed

- FTT (sTGC)
 - Voltage, current, & gas (x4 modules x4 disks)
 - Flow meters or other global gas diagnostics
 - If I understand Jeff's framework, the will be saved here into online DB
 - Efficiency would be viewable in online DB or shift plots
 - Note TPC records drift velocity – a similarly computed value
 - Status flags
- FST
 - Nothing in Online DB yet
 - Voltages + Currents
 - Status flags?
- FCS : anything more is needed?

Offline Database

- Primary uses
 - Offline calibration & reconstruction parameters
 - Geometry maps
- I was involved with most of TOF and eTOF calibration procedures.



2/12/21

Database structure : Calibrations_etof

Table Name	Last entryTime	Index Field(s)	Records
<u>NodeRelation</u>	2019-12-16 18:48:26	<u>ParentID</u> <u>NodeID</u> <u>BranchID</u> <u>ConfigID</u>	14
<u>Nodes</u>	2019-12-16 18:47:36	<u>name</u> <u>versionKey</u>	15
<u>etofCalibParam</u>	2021-02-01 13:36:20	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	11
<u>etofDetResolution</u>	2021-02-01 13:36:23	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	4
<u>etofDigiSlewCorr</u>	2021-02-01 13:36:25	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	6
<u>etofDigiTimeCorr</u>	2021-02-01 13:36:28	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	9
<u>etofDigiTotCorr</u>	2021-02-01 13:36:31	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	7
<u>etofHitParam</u>	2021-02-01 13:36:33	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	4
<u>etofMatchParam</u>	2021-02-01 13:36:37	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	6
<u>etofPulserTimeDiffGbtX</u>	2021-02-01 13:36:39	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	4
<u>etofPulserTotPeak</u>	2021-02-01 13:36:41	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	4
<u>etofResetTimeCorr</u>	2021-02-01 13:36:43	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	50
<u>etofSignalVelocity</u>	2021-02-01 13:36:44	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	4
<u>etofSimEfficiency</u>	2021-02-01 13:36:47	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	4
<u>etofStatusMap</u>	2021-02-01 13:36:50	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	5
<u>etofTimingWindow</u>	2021-02-01 13:36:52	<u>nodeID</u> <u>elementID</u> <u>beginTime</u> <u>flavor</u> <u>deactive</u>	7
<u>schema</u>	N/A		32
<u>structure</u>	2019-12-16 18:46:08	<u>name</u> <u>ID</u>	14

Database Pros / Cons

- Pros

- Timestamped (history)
- Can be modified
- Provides authoritative information (single source)
- Accessible outside RCF (in docker containers, PDSF etc.)

- Cons

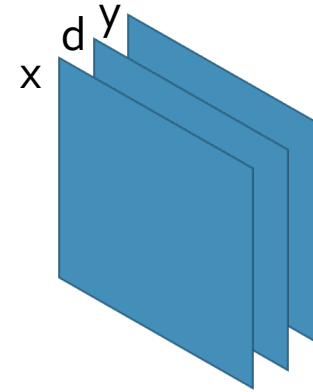
- Rigid schema (table structure) – hard to change
- Not efficient for large data
- Significant work to setup table
- Tables must be updated for every year / Run (Species + energy, not “run”)

What should go in offline DB?

- Mapping tables if they are likely to change
- Status tables
 - Automate if possible
 - Fine granularity better – improves realisticness of simulation
- Calibration parameters
 - Computed geometry alignment variables
 - Computed time alignments
- Detailed simulation parameters for mirroring data
 - E.g. for sTGC we may have cluster parameters per (x,y,D)/module/disk
 - Parameters for realistic representation of signals from electronics (if their status changes due to gains, etc from one Run to next)
- Question for Tonko: Can DAQ PCs read from Online and/or Offline DB?

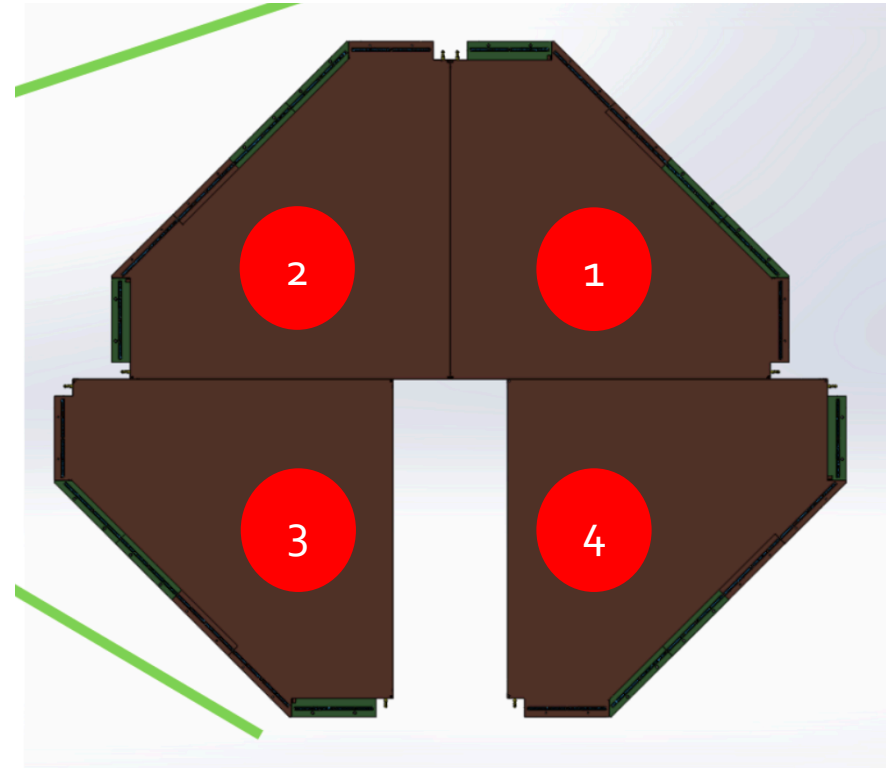
Preliminary Alignment Plan

- Precision alignment of forward systems
 - Combination of internal(local) + global alignments



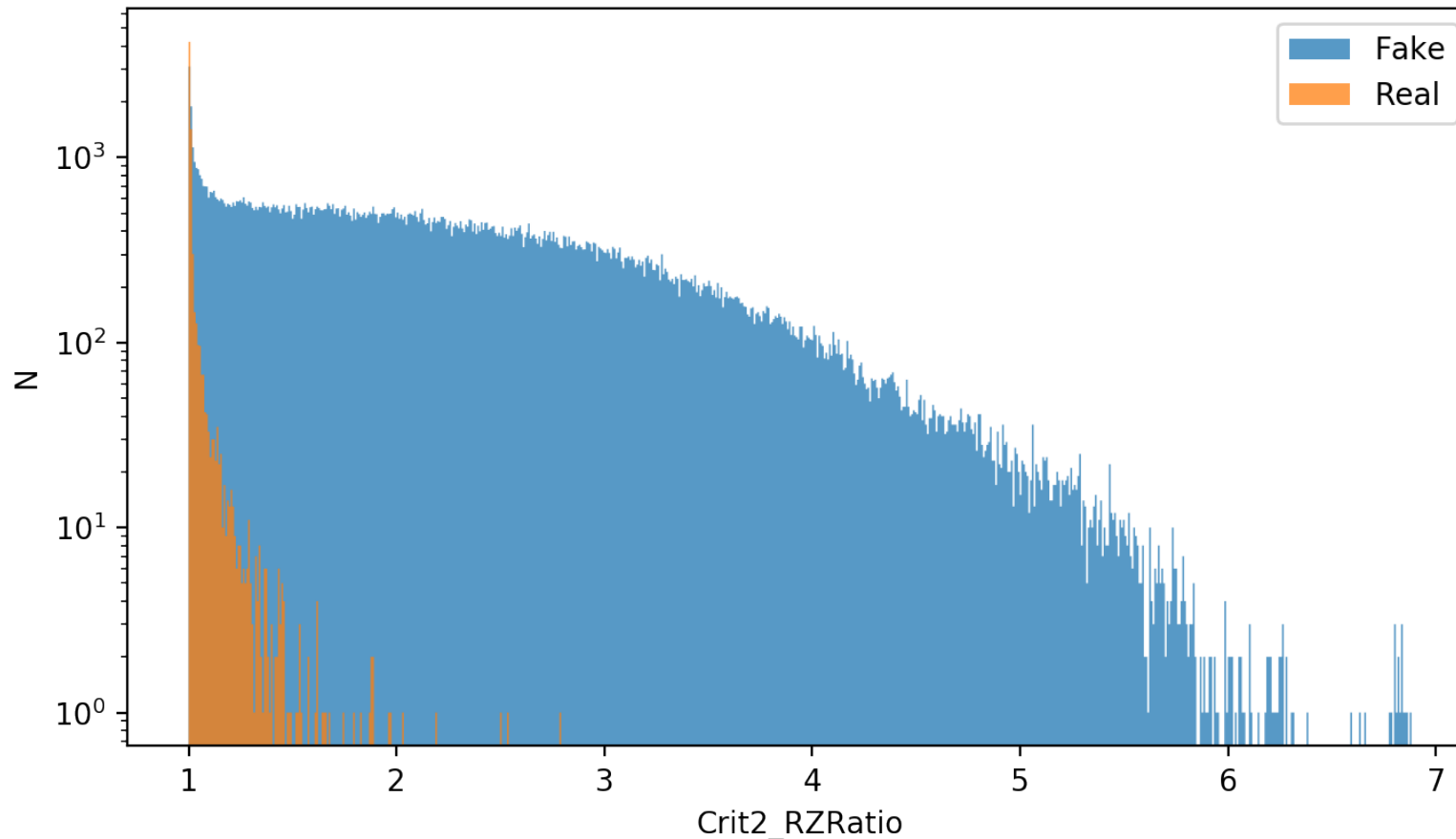
sTGC Example:

- Internal alignment
 - X / d / Y correspondence
 - Module to module :
 - Translation: $dx, dy, (dz?)$
 - Rotation : α_z
- Global Alignment
 - Translation: dx, dy, dz
 - Rotation : α_x, α_y



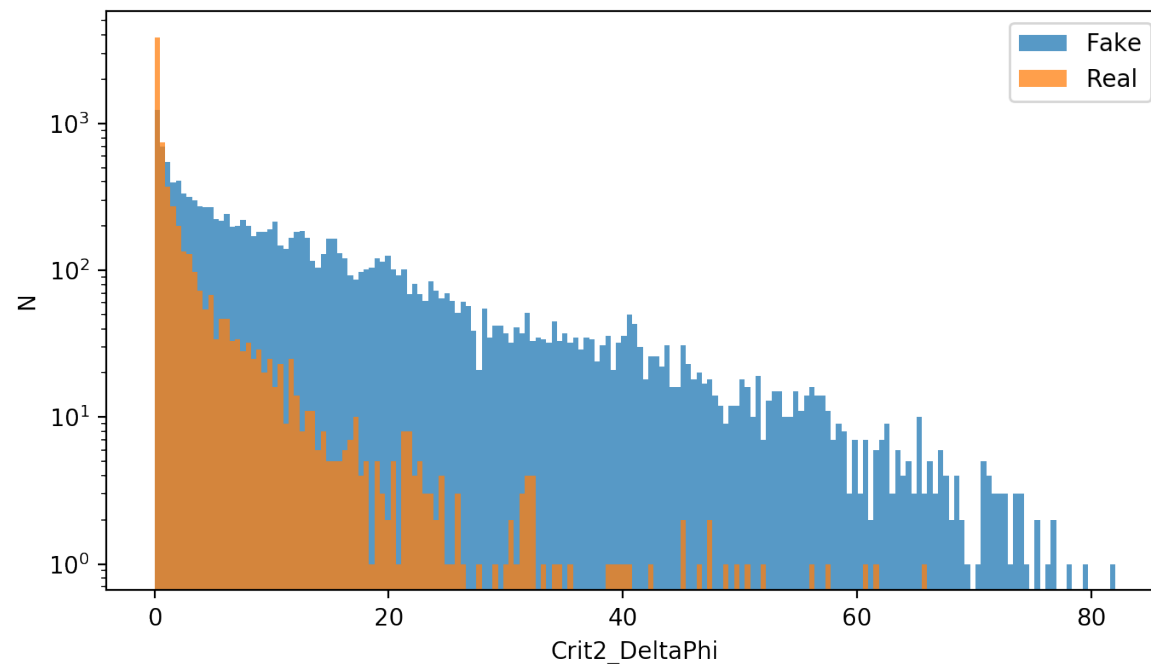
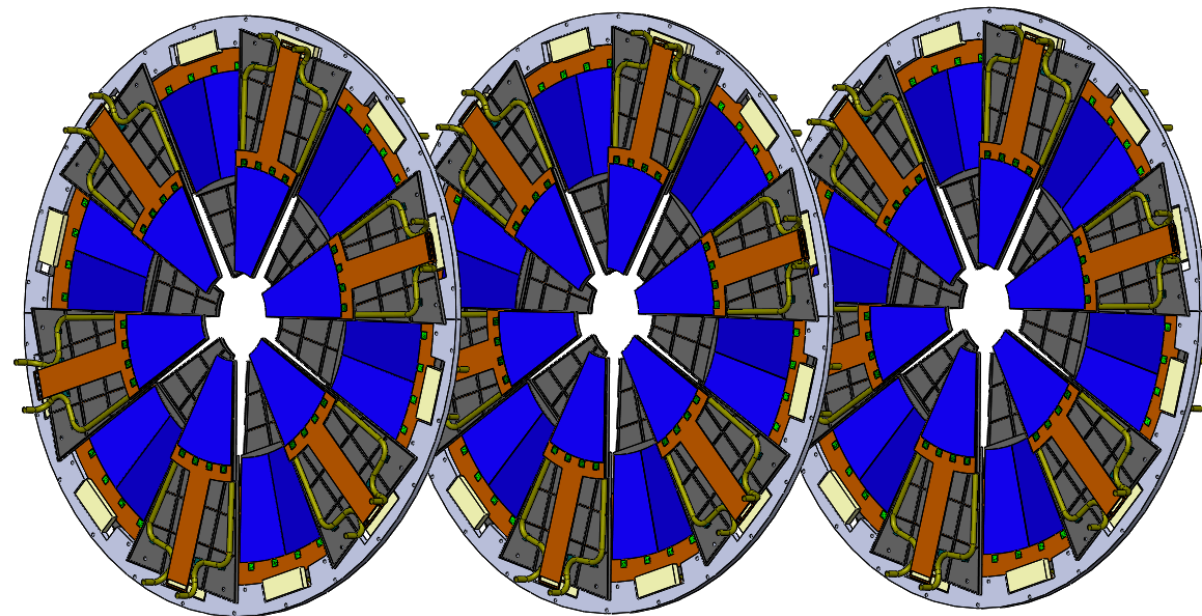
Global Tracking Alignment

- sTGC global alignment can be determined **iteratively**
- Optimize on straight-line correspondence of hits (in $r - z$)
- sTGC to FST alignment will be challenging



FST Alignment

- Internal alignment
 - Inner to outer sector
 - Translation: $dr\ d\phi$
 - Rotation: α_z (local)
- Disk to disk & sTGC
 - Translations: dx, dy, dz
 - Rotations: $\alpha_z, \alpha_y, \alpha_x$
- FST has precision $d\phi$ – optimize track seed Delta phi
- For both internal and global alignment



Alignment to FCS

- Use same technique as TPC track -> TOF matching
- Allow the FCS geometry to float (global translation)
- Project tracks to high quality clusters
 - Calculate dx, dy, dz from track projection vs. measured FCS position
- Iterative approach

Calibration dataset

- For tracking cosmic rays passing through FWD detectors would be ideal
- Important considerations
 - How to trigger on clean cosmics
 - Field on / field off
 - Statistics required for precision calibration
- Low multiplicity events may also be helpful
- Maybe use TPC + EPD/VPD/ZDC to select low mult events
- Calibrate tracking / FCS matching in these low mult events

Summary

- Online Database : For running / real-time parameters
 - Electronics: voltages, currents, status
 - Gas systems: Flow rates, pressures, etc.
 - Temperature and humidity
- Offline Database : For calibration, simulation, reconstruction
 - Each system will need a StXXDbMaker
 - Setting up tables is involved (will cover at later time) so give thought to what should go into
 - Most necessary for things that change for each species / energy etc.
- Alignment
 - Geometry alignment through iterative procedure
 - Need cosmic / low mult data – think about trigger / event selection